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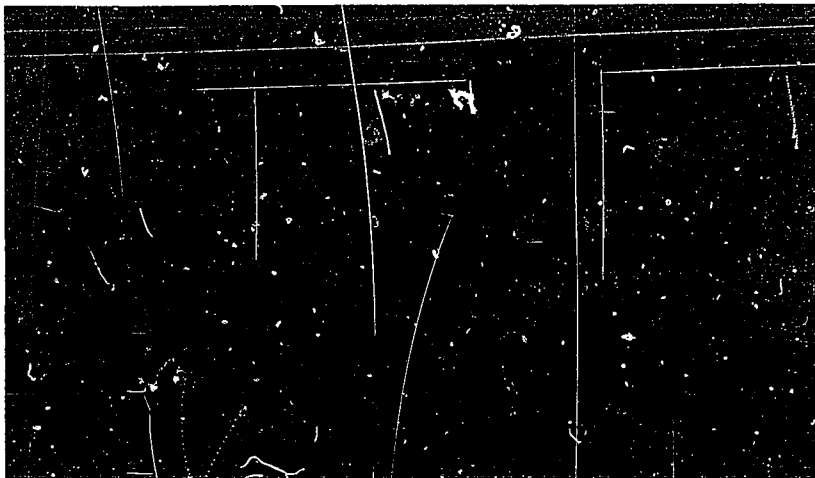
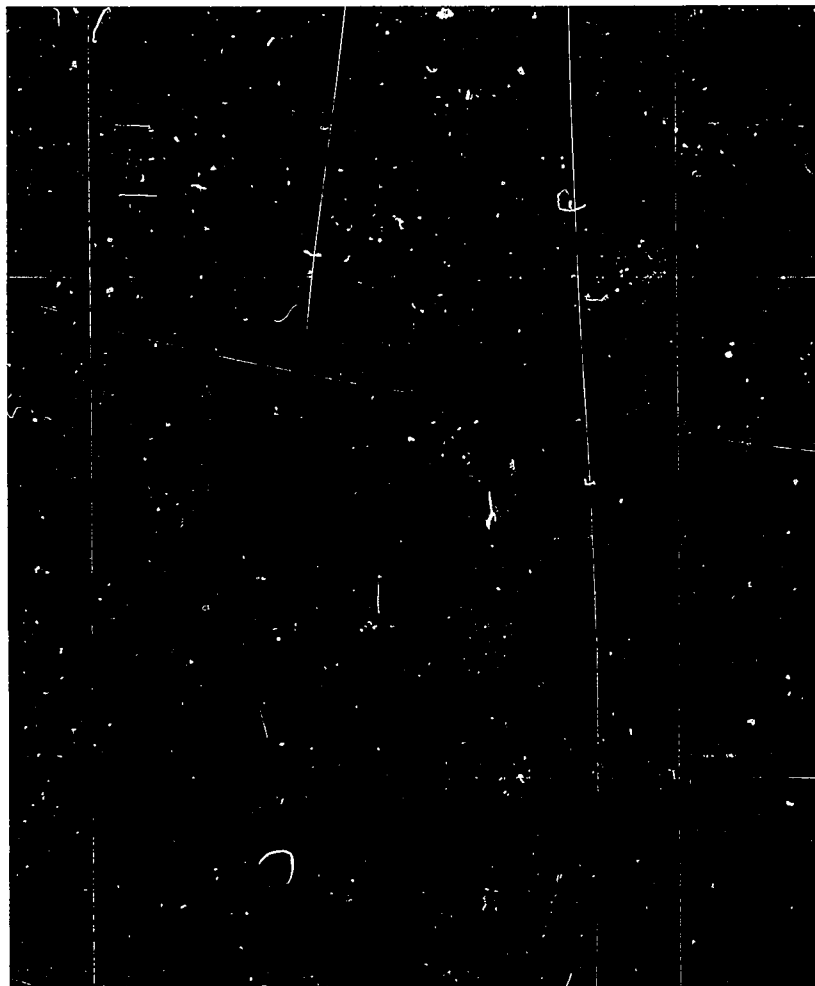
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ABSTRACT

Children's pronunciations of vowel clusters in synthetic words were analyzed in relation to common English words containing the same vowel clusters. Subjects were 436 elementary students of both high and low reading levels from a suburban, an urban, and a rural community. Discussion of the problem and procedures of the study are found in Part 1, RE 003 626; results and conclusions are found in Part 2, RE 003 627. Part 3 contains the bibliography and nine appendixes: (A) International Phonetic Alphabet Symbols for Phonemes of American English; (B) Four Forms of Vowel Cluster Multiple-Choice Test Used with Pilot Studies A and B; (C) Four Forms of Vowel Cluster Multiple-Choice Test Used with the Study; (D) Waterloo Subject's Code Number, Sex, Grade Level, Reading Score, and IQ Score; (E) Study Subject's Code Number, Sex, Grade Level, School, Reading Score, and IQ Score; (F) Summary of Reading Achievement Tests; Intelligence Tests, and Dates of Administration to the Subjects of Pilot Studies A and B and the Study; (G) F Values of Main Effects and Interactions for Analysis One; (H) F Values of Main Effects and Interactions for Analysis Two; and (I) Assumptions Underlying the Use of Analysis of Variance. (VJ)

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Technical Report No. 149 Part III

FACTORS RELATED TO THE PRONOUNCIATION
OF VOWEL CLUSTERS

Report from the Project on Basic Pre-Reading
Skills: Identification and Improvement

Richard L. Venezky, Principal Investigator

By Dale D. Johnson

U. S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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Thomas Barrett, Professor of Curriculum & Instruction,
Elementary Education
Chairman of Examining Committee

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
Madison, Wisconsin

September, 1970

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STATEMENT OF FOCUS

The Wisconsin Research and Development Center for Cognitive Learning focuses on contributing to a better understanding of cognitive learning by children and youth and to the improvement of related educational practices. The strategy for research and development is comprehensive. It includes basic research to generate new knowledge about the conditions and processes of learning and about the processes of instruction, and the subsequent development of research-based instructional materials, many of which are designed for use by teachers and others for use by students. These materials are tested and refined in school settings. Throughout these operations behavioral scientists, curriculum experts, academic scholars, and school people interact, insuring that the results of Center activities are based soundly on knowledge of subject matter and cognitive learning and that they are applied to the improvement of educational practice.

This Technical Report is from the Basic Pre-Reading Skills: Identification and Improvement Project in Program 1. General objectives of the Program are to generate new knowledge about concept learning and cognitive skills, to synthesize existing knowledge, and to develop educational materials suggested by the prior activities. Contributing to these Program objectives, this project's basic goal is to determine the processes by which children aged four to seven learn to read and to identify the specific reasons why many children fail to acquire this ability. Later studies will be conducted to find experimental techniques and tests for optimizing the acquisition of skills needed for learning to read.

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ABSTRACT

Statement of the Problem

The purpose of this study was to determine the pronunciations children give to synthetic words containing vowel cluster spellings, and to analyze the observed pronunciations in relation to common English words containing the same vowel clusters. The pronunciations associated with vowel cluster spellings are among the most unpredictable letter-sound correspondences in English. If learning to read includes learning to translate from spelling to sound, then vowel clusters should pose a particularly difficult problem for children. Determining the manner in which children solve this problem--i.e., the factors related to children's pronunciations of vowel clusters in unfamiliar words--could shed more general light on this complex decoding act.

The study dealt with the following independent variables: grade level (second, fourth, and sixth), sex, reading level (high and low), community type (suburban, urban, and rural), vowel cluster (a subset of nine--ai, au, ay, ea, ie, oa, oo, ou, and ow), and response type (principal and secondary). The dependent variables were difference scores between the subjects' principal and secondary pronunciations of vowel clusters and the principal and secondary pronunciation proportions of vowel clusters on two corpora--a 1963 modification of the 20,000 most common words on the Thorndike Frequency count (Type Corpus) and the most frequent 1,000 words on the 1967 Kucera and Francis computational analysis of present-day American English (Token Corpus).

Procedures

Two pilot studies were conducted to refine and modify the testing instrument, a 100 item multiple choice test. The instrument included 90 synthetic words containing vowel clusters, (ten synthetic words for each of the nine selected vowel clusters) and ten check items. Four real word distractors contained the major pronunciations for the vowel cluster on the type and token corpora.

The sample consisted of 436 elementary pupils from a suburban an urban, and a rural community, all in Wisconsin. Second, fourth and sixth grade boys and girls of both high and low reading levels were included. Each subject responded to two 50 item halves of the instrument on two consecutive days.

To test twelve hypotheses and answer three questions two analyses were performed. In each analysis the design was a 3 x 2 x 2 x 3 x 8 (or 7) x 2 analysis of variance, in which the main effects were grade, sex, reading level, community type, vowel cluster (eight on the type analysis and seven on the token analysis) and response type.

Results

1. Grade level was significantly related to vowel cluster pronunciation. There was an upward progression from second to sixth grade in the proportion of principal vowel cluster pronunciations given in both analyses.
2. There were no significant sex differences in either analysis.
3. Subjects of high reading level consistently gave more principal pronunciations to vowel clusters in both analyses than the poorer readers.
4. Suburban subjects tended to give the principal pronunciations of vowel clusters more consistently than urban and rural subjects.
5. Subjects' pronunciations were more closely related to word types than to word tokens, particularly to the principal pronunciations in the type corpus.
6. Word configuration seemed related to vowel cluster pronunciations.

Conclusions

1. As children progress through the grades, their vowel cluster pronunciations more closely parallel the correspondences occurring in common English words.
2. Being a preference inventory, not a test of "correctness", sex differences were not significant.
3. Better readers are less deviant from correspondences in common words in their pronunciation of vowel clusters than are poorer readers.
4. Suburban children tend to more closely approximate the vowel cluster correspondence frequencies in common words than urban and rural pupils.
5. Principal pronunciations of vowel clusters in word types relate more closely to children's pronunciations than do the correspondences in word tokens.
6. Contextual environment and word position seem to influence vowel cluster pronunciations by children.

APPENDICES

Appendix A

International Phonetic Alphabet Symbols for Phonemes of American English

International Phonetic Alphabet Symbols
for Phonemes of American English

<u>Vowels</u>		
<u>Phonemic Symbol</u>	<u>Representative Word</u>	<u>Qualification</u>
/i/	bee	
/ɪ/	bit	
/e/	date	
/ɛ/	yet	
/æ/	hat	
/a/	bath	Used in Eastern U.S. between /æ/ and /ɛ/
/ʌ/	hot	
/ɔ/	jaw	
/o/	go	
/ʊ/	full	
/u/	mood	
/ə/	above	Unaccented syllable only
/ʌ/	above	Accented syllable only

Diphthongs

/ai/	while
/au/	how
/ɔi/	boy
/ju/	fuse

International Phonetic Alphabet Symbols
for Phonemes of American English, cont.

<u>Consonants</u>	
<u>Phonemic Symbol</u>	<u>Representative Word</u>
/p/	pin
/b/	big
/t/	team
/d/	dish
/k/	cat
/g/	go
/f/	fall
/v/	vision
/θ/	breath
/ð/	breathe
/s/	sang
/z/	using
/ʃ/	dish
/ʒ/	vision
/h/	happy
/tʃ/	watch
/dʒ/	gym
/m/	meat
/n/	new
/ŋ/	angry

International Phonetic Alphabet Symbols
for Phonemes of American English, cont.

<u>Phonemic Symbol</u>	<u>Representative Word</u>
/l/	full
/w/	watch
/hw/	while
/j/	yet
/r/	rate

Appendix B

Four Forms of Vowel Cluster Multiple-Choice Test
Used With Pilot Studies A and B

COMPOUND VOWELS - MULTIPLE-CHOICE TEST - LIST A-1

This is a test of how you pronounce unfamiliar English words. At the far left of each page, in every row of the test, there is a short English-like word that you probably have never seen before. On the right, in each row, there are three words that you already know how to say. First decide how you would say the new word on the left, and notice what sound you make for the underlined letter. Then circle the word on the right that has that same sound for its underlined letters.

Here are three examples:

- A. mip him bed go
- B. gan let call dad
- C. pode baby no cow

As you work through the test be careful to check which letters are underlined in each word. It could be any one of them or two together.

These are the words you know that will be on the test. Listen to the sound of the underlined letters as you read these words with me.

go	l <u>e</u> t	put	s <u>a</u> w	g <u>a</u> ve	t <u>o</u> ok	h <u>o</u> use
n <u>o</u>	b <u>u</u> t	d <u>a</u> d	n <u>e</u> w	b <u>a</u> by		
b <u>e</u>	r <u>a</u> n	tr <u>y</u>	c <u>o</u> w	c <u>o</u> me		
m <u>y</u>	c <u>a</u> ll					
w <u>e</u>	b <u>e</u> d					
t <u>o</u>	h <u>i</u> m					
	p <u>i</u> n					

1. th <u>ai</u> m	l <u>e</u> t	b <u>u</u> t	g <u>a</u> ve
2. ch <u>au</u> se	r <u>a</u> n	c <u>a</u> ll	g <u>o</u>
3. p <u>o</u> le <u>a</u> d	b <u>e</u>	b <u>e</u> d	b <u>a</u> by
4. t <u>a</u> y	h <u>i</u> m	g <u>a</u> ve	b <u>e</u> d
5. c <u>o</u> ad	s <u>a</u> w	c <u>o</u> w	n <u>o</u>
6. p <u>i</u> d	h <u>i</u> m	p <u>i</u> n	b <u>u</u> t
7. ab <u>i</u> ek	m <u>y</u>	b <u>e</u> d	w <u>e</u>
8. mon <u>oo</u> d	n <u>e</u> w	p <u>u</u> t	b <u>u</u> t
9. c <u>ou</u> dry	c <u>o</u> w	t <u>o</u> ok	h <u>e</u> w
10. fr <u>ow</u> l	c <u>a</u> ll	h <u>ou</u> se	g <u>o</u>
11. m <u>a</u> n	s <u>a</u> w	b <u>a</u> by	d <u>a</u> d
12. p <u>o</u> k <u>a</u> y	p <u>i</u> n	g <u>a</u> ve	b <u>e</u>
13. k <u>a</u> id <u>o</u> n	l <u>e</u> t	h <u>i</u> m	g <u>a</u> ve
14. s <u>a</u> ut	c <u>o</u> w	r <u>a</u> n	c <u>a</u> ll
15. d <u>e</u> ase	b <u>e</u>	l <u>e</u> t	b <u>a</u> by
16. m <u>ul</u> l <u>ow</u>	t <u>o</u> ok	g <u>o</u>	h <u>ou</u> se
17. m <u>a</u> n <u>ou</u> s	b <u>u</u> t	c <u>o</u> w	p <u>u</u> t
18. y <u>oo</u> k	t <u>o</u>	p <u>u</u> t	c <u>o</u> me
19. y <u>i</u> et	t <u>r</u> y	w <u>e</u>	b <u>e</u> d
20. s <u>mo</u> al	c <u>o</u> w	n <u>o</u>	s <u>a</u> w
21. d <u>ro</u> on	b <u>u</u> t	n <u>e</u> w	p <u>u</u> t
22. s <u>la</u> um	g <u>o</u>	s <u>a</u> w	r <u>a</u> n
23. <u>oa</u> n	h <u>ou</u> se	t <u>o</u>	n <u>o</u>
24. d <u>a</u> t	b <u>e</u> d	t <u>o</u> ok	p <u>i</u> n
25. b <u>e</u> ase	w <u>e</u>	g <u>a</u> ve	l <u>e</u> t

26. pl <u>ou</u> b	put	to	now
27. com <u>ie</u> l	be	ba <u>by</u>	le <u>t</u>
28. go <u>w</u> l	no	hou <u>s</u> e	sa <u>w</u>
29. cha <u>ig</u>	be <u>d</u>	we	ba <u>by</u>
30. be <u>ta</u> y	my	ga <u>ve</u>	we
31. fee <u>l</u>	hi <u>m</u>	be <u>d</u>	be
32. ba <u>ish</u>	ga <u>ve</u>	be	try
33. trou <u>ld</u>	no	put	ne <u>w</u>
34. va <u>yt</u>	pi <u>n</u>	le <u>t</u>	ga <u>ve</u>
35. w <u>ies</u>	try	pi <u>n</u>	be
36. thea <u>t</u>	ba <u>by</u>	be	le <u>t</u>
37. aclo <u>w</u>	hou <u>s</u> e	call	no
38. broa <u>m</u>	sa <u>w</u>	go	ne <u>w</u>
39. na <u>ugh</u>	ra <u>n</u>	sa <u>w</u>	co <u>w</u>
40. froo <u>l</u>	to	put	call
41. goa <u>g</u>	co <u>w</u>	no	sa <u>w</u>
42. co <u>te</u>	hou <u>s</u> e	to	go
43. por <u>ie</u>	my	we	hi <u>m</u>
44. du <u>sa</u> ig	be <u>d</u>	ga <u>ve</u>	be
45. bloo <u>se</u>	go	put	ne <u>w</u>
46. a <u>ys</u>	try	ga <u>ve</u>	le <u>t</u>
47. ea <u>lod</u>	be <u>d</u>	we	ga <u>ve</u>
48. fo <u>ugh</u>	no	co <u>w</u>	ne <u>w</u>
49. ha <u>up</u>	call	go	co <u>w</u>
50. zo <u>wn</u>	go	call	hou <u>s</u> e

COMPOUND VOWELS - MULTIPLE-CHOICE TEST - LIST A-2

This is a test of how you pronounce unfamiliar English words. At the far left of each page, in every row of the test, there is a short English-like word that you probably have never seen before. On the right, in each row, there are three words that you already know how to say. First decide how you would say the new word on the left, and notice what sound you make for the underlined letter. Then circle the word on the right that has that same sound for its underlined letters.

Here are three examples:

- A. mip him bed go
- B. gan let call dad
- C. pode baby no cow

As you work through the test be careful to check which letters are underlined in each word. It could be any one of them or two together.

These are the words you know that will be on the test. Listen to the sound of the underlined letters as you read these words with me.

go let put saw gave took house

no but dad new baby

be ran try cow come

my call

we bed

to him

pin

1. <u>s</u> aut	cow	call	ran
2. por <u>i</u> e	we	my	him
3. <u>a</u> ys	try	gave	let
4. co <u>a</u> d	cow	saw	no
5. frow <u>l</u>	house	call	go
6. o <u>a</u> n	no	to	house
7. de <u>a</u> se	let	be	baby
8. sm <u>o</u> al	cow	saw	no
9. p <u>i</u> d	but	him	pin
10. <u>e</u> alod	gave	bed	we
11. man <u>o</u> us	put	cow	but
12. y <u>o</u> ok	come	to	put
13. th <u>a</u> im	but	let	gave
14. f <u>o</u> ugh	cow	no	new
15. blo <u>o</u> se	put	new	go
16. v <u>a</u> yt	pin	gave	let
17. z <u>o</u> wn	call	house	go
18. d <u>a</u> t	bed	pin	took
19. b <u>a</u> ish	gave	try	be
20. fro <u>o</u> l	put	call	to
21. the <u>a</u> t	let	be	baby
22. ac <u>l</u> ow	no	house	call
23. h <u>a</u> up	call	cow	go
24. w <u>i</u> es	pin	be	try
25. go <u>w</u> l	house	saw	no

26. k <u>a</u> id <u>o</u> n	l <u>e</u> t	g <u>a</u> ve	h <u>i</u> m
27. pl <u>o</u> u <u>b</u>	n <u>o</u> w	pu <u>t</u>	to
28. dro <u>o</u> n	n <u>e</u> w	bu <u>t</u>	pu <u>t</u>
29. ab <u>i</u> ek	be <u>d</u>	my	w <u>e</u>
30. co <u>t</u> e	hou <u>s</u> e	go	to
31. cou <u>d</u> ry	too <u>k</u>	co <u>w</u>	ne <u>w</u>
32. na <u>u</u> gh	co <u>w</u>	sa <u>w</u>	ra <u>n</u>
33. po <u>k</u> ay	g <u>a</u> ve	pi <u>n</u>	be
34. bro <u>a</u> m	go	sa <u>w</u>	ne <u>w</u>
35. sla <u>u</u> m	sa <u>w</u>	go	ra <u>n</u>
36. mullo <u>w</u>	hou <u>s</u> e	too <u>k</u>	go
37. fee <u>l</u>	be	be <u>d</u>	h <u>i</u> m
38. be <u>t</u> ay	w <u>e</u>	my	g <u>a</u> ve
39. be <u>a</u> se	g <u>a</u> ve	w <u>e</u>	l <u>e</u> t
40. go <u>a</u> g	co <u>w</u>	sa <u>w</u>	no
41. cha <u>i</u> g	w <u>e</u>	be <u>d</u>	ba <u>b</u> y
42. trou <u>l</u> d	pu <u>t</u>	no	ne <u>w</u>
43. du <u>s</u> a <u>i</u> g	be <u>d</u>	be	g <u>a</u> ve
44. cha <u>u</u> se	ca <u>l</u> l	ra <u>n</u>	go
45. co <u>m</u> ie <u>l</u>	be	l <u>e</u> t	ba <u>b</u> y
46. monoo <u>d</u>	pu <u>t</u>	bu <u>t</u>	ne <u>w</u>
47. ma <u>n</u>	ba <u>b</u> y	da <u>d</u>	sa <u>w</u>
48. y <u>i</u> et	be <u>d</u>	try	w <u>e</u>
49. ta <u>y</u>	h <u>i</u> m	be <u>d</u>	g <u>a</u> ve
50. po <u>l</u> ea <u>d</u>	be	ba <u>b</u> y	be <u>d</u>

COMPOUND VOWELS - MULTIPLE-CHOICE TEST - LIST B-1

This is a test of how you pronounce unfamiliar English words. At the far left of each page, in every row of the test, there is a short English-like word that you probably have never seen before. On the right, in each row, there are three words that you already know how to say. First decide how you would say the new word on the left, and notice what sound you make for the underlined letter. Then circle the word on the right that has that same sound for its underlined letters.

Here are three examples:

- A. mip him bed go
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As you work through the test be careful to check which letters are underlined in each word. It could be any one of them or two together.

These are the words you know that will be on the test. Listen to the sound of the underlined letters as you read these words with me.

go let put saw gave took house

no but dad new baby

be ran try cow come

my call

we bed

to him

pin

1. <u>boys</u>	<u>baby</u>	<u>him</u>	<u>took</u>
2. <u>loat</u>	<u>cow</u>	<u>saw</u>	<u>no</u>
3. <u>chays</u>	<u>try</u>	<u>gave</u>	<u>let</u>
4. <u>spro<u>w</u></u>	<u>house</u>	<u>call</u>	<u>go</u>
5. <u>houn</u>	<u>put</u>	<u>cow</u>	<u>but</u>
6. <u>are<u>ak</u></u>	<u>let</u>	<u>be</u>	<u>baby</u>
7. <u>ma<u>uf</u></u>	<u>cow</u>	<u>call</u>	<u>ran</u>
8. <u>th<u>ood</u></u>	<u>come</u>	<u>put</u>	<u>to</u>
9. <u>mie<u>f</u></u>	<u>we</u>	<u>my</u>	<u>him</u>
10. <u>oga<u>im</u></u>	<u>my</u>	<u>let</u>	<u>gave</u>
11. <u>stapp<u>ow</u></u>	<u>call</u>	<u>house</u>	<u>go</u>
12. <u>tr<u>ak</u></u>	<u>took</u>	<u>gave</u>	<u>to</u>
13. <u>gie<u>s</u></u>	<u>pin</u>	<u>be</u>	<u>try</u>
14. <u>po<u>ad</u></u>	<u>go</u>	<u>saw</u>	<u>new</u>
15. <u>po<u>om</u></u>	<u>put</u>	<u>but</u>	<u>to</u>
16. <u>kon<u>ay</u></u>	<u>pin</u>	<u>gave</u>	<u>let</u>
17. <u>ko<u>ump</u></u>	<u>cow</u>	<u>no</u>	<u>new</u>
18. <u>la<u>ip</u></u>	<u>my</u>	<u>let</u>	<u>gave</u>
19. <u>fe<u>ad</u></u>	<u>let</u>	<u>be</u>	<u>baby</u>
20. <u>pa<u>ud</u></u>	<u>call</u>	<u>cow</u>	<u>go</u>
21. <u>bla<u>y</u></u>	<u>him</u>	<u>bed</u>	<u>gave</u>
22. <u>yo<u>ap</u></u>	<u>cow</u>	<u>saw</u>	<u>no</u>
23. <u>bl<u>ue</u></u>	<u>new</u>	<u>no</u>	<u>saw</u>
24. <u>po<u>up</u></u>	<u>but</u>	<u>cow</u>	<u>put</u>
25. <u>mo<u>ok</u></u>	<u>go</u>	<u>to</u>	<u>put</u>

26. pri <u>en</u> t	be <u>d</u>	my	we
27. tro <u>wn</u>	hou <u>se</u>	sa <u>w</u>	no
28. de <u>a</u> ch	be <u>d</u>	be	ba <u>by</u>
29. au <u>co</u> l	co <u>w</u>	sa <u>w</u>	ra <u>n</u>
30. t <u>ai</u> se	ga <u>ve</u>	hi <u>m</u>	tr <u>y</u>
31. fre <u>a</u> n	le <u>t</u>	we	ga <u>ve</u>
32. wo <u>u</u> th	no <u>w</u>	pu <u>t</u>	to
33. su <u>n</u> t	da <u>d</u>	hi <u>m</u>	sa <u>w</u>
34. sp <u>ow</u> s	go	to <u>ok</u>	hou <u>se</u>
35. ha <u>u</u> ge	sa <u>w</u>	go	ra <u>n</u>
36. slo <u>ot</u>	ne <u>w</u>	bu <u>t</u>	pu <u>t</u>
37. bla <u>in</u> g	le <u>t</u>	ga <u>ve</u>	hi <u>m</u>
38. to <u>a</u> ng	go	sa <u>w</u>	ne <u>w</u>
39. z <u>ie</u> gle	be <u>d</u>	my	we
40. on <u>ch</u> ay	we	my	ga <u>ve</u>
41. fo <u>w</u> t	go	hou <u>se</u>	bu <u>t</u>
42. b <u>ie</u> sh	be <u>d</u>	tr <u>y</u>	we
43. to <u>u</u> l	to <u>ok</u>	co <u>w</u>	ne <u>w</u>
44. sa <u>w</u>	ca <u>ll</u>	no	da <u>d</u>
45. bo <u>a</u> se	go	co <u>w</u>	sa <u>w</u>
46. du <u>c</u> ay	hi <u>m</u>	be <u>d</u>	ga <u>ve</u>
47. r <u>ai</u> tel	ga <u>ve</u>	ra <u>n</u>	tr <u>y</u>
48. vo <u>o</u> p	pu <u>t</u>	bu <u>t</u>	ne <u>w</u>
49. au <u>p</u>	ca <u>ll</u>	hou <u>se</u>	da <u>d</u>
50. chea <u>m</u>	be	ba <u>by</u>	be <u>d</u>

COMPOUND VOWELS - MULTIPLE-CHOICE TEST - LIST B-2

This is a test of how you pronounce unfamiliar English words. At the far left of each page, in every row of the test, there is a short English-like word that you probably have never seen before. On the right, in each row, there are three words that you already know how to say. First decide how you would say the new word on the left, and notice what sound you make for the underlined letter. Then circle the word on the right that has that same sound for its underlined letters.

Here are three examples:

- A. mip him bed go
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As you work through the test be careful to check which letters are underlined in each word. It could be any one of them or two together.

These are the words you know that will be on the test. Listen to the sound of the underlined letters as you read these words with me.

g <u>o</u>	l <u>e</u> t	put	s <u>a</u> w	g <u>a</u> ve	t <u>o</u> ok	h <u>o</u> use
n <u>o</u>	b <u>u</u> t	d <u>a</u> d	n <u>e</u> w	b <u>a</u> by		
b <u>e</u>	r <u>a</u> n	try	c <u>o</u> w	c <u>o</u> me		
m <u>y</u>	c <u>a</u> ll					
w <u>e</u>	b <u>e</u> d					
t <u>o</u>	h <u>i</u> m					
	p <u>i</u> n					

1. on <u>ch</u> ay	<u>g</u> ave	<u>w</u> e	<u>m</u> y
2. <u>a</u> u <u>c</u> ol	<u>n</u> o	<u>c</u> ow	<u>s</u> aw
3. sp <u>o</u> ws	<u>t</u> ook	<u>h</u> ouse	<u>g</u> o
4. o <u>g</u> aim	<u>m</u> y	<u>g</u> ave	<u>l</u> et
5. p <u>r</u> ient	<u>m</u> y	<u>b</u> ed	<u>w</u> e
6. fr <u>e</u> an	<u>w</u> e	<u>g</u> ave	<u>l</u> et
7. b <u>i</u> esh	<u>t</u> ry	<u>w</u> e	<u>b</u> ed
8. tr <u>a</u> k	<u>g</u> ave	<u>t</u> ook	<u>t</u> o
9. st <u>a</u> ppow	<u>g</u> o	<u>c</u> all	<u>h</u> ouse
10. p <u>a</u> ud	<u>c</u> ow	<u>g</u> o	<u>c</u> all
11. r <u>a</u> itel	<u>t</u> ry	<u>g</u> ave	<u>r</u> an
12. m <u>a</u> uf	<u>c</u> all	<u>r</u> an	<u>c</u> ow
13. tr <u>o</u> wn	<u>s</u> aw	<u>n</u> o	<u>h</u> ouse
14. th <u>o</u> od	<u>t</u> o	<u>c</u> ome	<u>p</u> ut
15. d <u>e</u> ach	<u>b</u> aby	<u>b</u> ed	<u>b</u> e
16. d <u>u</u> cay	<u>g</u> ave	<u>h</u> im	<u>b</u> ed
17. bl <u>u</u> e	<u>n</u> o	<u>s</u> aw	<u>n</u> ew
18. v <u>o</u> op	<u>b</u> ut	<u>n</u> ew	<u>p</u> ut
19. <u>a</u> up	<u>d</u> ad	<u>c</u> all	<u>h</u> ouse
20. t <u>o</u> ul	<u>n</u> ew	<u>t</u> ook	<u>c</u> ow
21. bl <u>a</u> ing	<u>h</u> im	<u>l</u> et	<u>g</u> ave
22. f <u>e</u> ad	<u>b</u> e	<u>b</u> aby	<u>l</u> et
23. ch <u>a</u> ys	<u>g</u> ave	<u>l</u> et	<u>t</u> ry
24. l <u>o</u> at	<u>s</u> aw	<u>n</u> o	<u>c</u> ow
25. sl <u>o</u> ot	<u>p</u> ut	<u>n</u> ew	<u>b</u> ut

26. kon <u>ay</u>	g <u>ave</u>	l <u>et</u>	p <u>in</u>
27. <u>s</u> unt	h <u>im</u>	s <u>aw</u>	d <u>ad</u>
28. t <u>ai</u> se	tr <u>y</u>	g <u>ave</u>	h <u>im</u>
29. p <u>oa</u> d	s <u>aw</u>	n <u>ew</u>	g <u>o</u>
30. w <u>ou</u> th	pu <u>t</u>	to	n <u>ow</u>
31. ch <u>ea</u> n	be <u>d</u>	be	b <u>ab</u> y
32. m <u>oo</u> k	to	pu <u>t</u>	g <u>o</u>
33. h <u>au</u> ge	g <u>o</u>	ra <u>n</u>	s <u>aw</u>
34. to <u>an</u> g	g <u>o</u>	s <u>aw</u>	n <u>ew</u>
35. m <u>ie</u> f	h <u>im</u>	w <u>e</u>	m <u>y</u>
36. b <u>oy</u> s	to <u>ok</u>	b <u>ab</u> y	h <u>im</u>
37. f <u>ow</u> t	bu <u>t</u>	g <u>o</u>	h <u>ou</u> se
38. a <u>re</u> ak	be	b <u>ab</u> y	l <u>et</u>
39. s <u>aw</u>	d <u>ad</u>	ca <u>ll</u>	n <u>o</u>
40. p <u>ou</u> p	co <u>w</u>	pu <u>t</u>	bu <u>t</u>
41. bo <u>as</u> e	g <u>o</u>	co <u>w</u>	s <u>aw</u>
42. bl <u>ay</u>	h <u>im</u>	be <u>d</u>	g <u>ave</u>
43. po <u>om</u>	bu <u>t</u>	to	pu <u>t</u>
44. ko <u>um</u> p	n <u>o</u>	n <u>ew</u>	co <u>w</u>
45. g <u>ie</u> s	tr <u>y</u>	p <u>in</u>	be
46. ho <u>un</u>	co <u>w</u>	pu <u>t</u>	bu <u>t</u>
47. yo <u>ap</u>	s <u>aw</u>	n <u>o</u>	co <u>w</u>
48. la <u>ip</u>	g <u>ave</u>	m <u>y</u>	l <u>et</u>
49. z <u>ie</u> gle	m <u>y</u>	w <u>e</u>	be <u>d</u>
50. sp <u>ro</u> w	ca <u>ll</u>	h <u>ou</u> se	g <u>o</u>

Appendix C

Four Forms of Vowel Cluster Multiple-Choice Test Used With the Study

COMPOUND VOWELS - MULTIPLE-CHOICE TEST - LIST A-1

This is a test of how you pronounce unfamiliar English words. At the far left of each page, in every row of the test, there is a short English-like word that you probably have never seen before. On the right, in each row, there are four words that you already know how to say. First decide how you would say the new word on the left, and notice what sound you make for the underlined letter. Then circle the word on the right that has that same sound for its underlined letters.

Here are three examples:

- | | | | | | |
|----|---------------|---------------|---------------|--------------|--------------|
| A. | <u>m</u> ip | hi <u>m</u> | <u>b</u> ed | g <u>o</u> | s <u>a</u> y |
| B. | g <u>a</u> n | l <u>e</u> t | c <u>a</u> ll | d <u>a</u> d | s <u>o</u> |
| C. | p <u>o</u> de | b <u>a</u> by | n <u>o</u> | c <u>o</u> w | m <u>e</u> |

As you work through the test be careful to check which letters are underlined in each word. It could be any one of them or two together.

These are the words you know that will be on the test. Listen to the sound of the underlined letters as you read these words with me.

- | | | | | |
|-------------|---------------|------------|---------------|--------------|
| <u>p</u> ut | g <u>a</u> ve | n <u>o</u> | b <u>u</u> t | b <u>e</u> |
| <u>r</u> an | c <u>o</u> w | m <u>y</u> | b <u>a</u> ll | t <u>o</u> p |
| <u>o</u> ut | b <u>e</u> d | t <u>o</u> | <u>h</u> im | |

1.	th <u>a</u> im	my	bed	him	gave
2.	ch <u>a</u> use	ran	ball	no	cow
3.	po <u>l</u> ead	but	be	bed	gave
4.	ta <u>y</u>	my	him	gave	bed
5.	co <u>a</u> d	ball	cow	top	no
6.	pi <u>d</u>	him	my	put	but
7.	ab <u>i</u> ek	my	bed	be	him
8.	mo <u>n</u> ood	no	to	put	but
9.	co <u>u</u> dry	cow	but	to	put
10.	fr <u>o</u> wl	ball	top	out	no
11.	ma <u>n</u>	him	ball	gave	ran
12.	po <u>k</u> ay	my	bed	gave	him
13.	ka <u>i</u> don	gave	my	him	bed
14.	sa <u>u</u> t	cow	ran	ball	no
15.	de <u>a</u> se	be	but	bed	gave
16.	mu <u>l</u> low	ball	out	top	no
17.	ma <u>n</u> ous	to	but	cow	put
18.	yo <u>o</u> k	to	no	put	but
19.	yi <u>e</u> t	my	we	him	bed
20.	smo <u>a</u> l	top	cow	no	ball
21.	droo <u>n</u>	no	but	to	put
22.	sla <u>u</u> m	no	cow	ball	ran
23.	oa <u>n</u>	ball	cow	top	no
24.	da <u>t</u>	put	bed	no	ran
25.	be <u>a</u> se	be	but	gave	bed

26.	pl <u>ou</u> b	pu <u>t</u>	to	co <u>w</u>	bu <u>t</u>
27.	co <u>mi</u> el	my	be	hi <u>m</u>	be <u>d</u>
28.	go <u>w</u> l	no	to <u>p</u>	ou <u>t</u>	ba <u>ll</u>
29.	cha <u>ig</u>	be <u>d</u>	my	ga <u>ve</u>	hi <u>m</u>
30.	be <u>ta</u> y	ga <u>ve</u>	my	hi <u>m</u>	be <u>d</u>
31.	fe <u>e</u> l	hi <u>m</u>	be	be <u>d</u>	my
32.	ba <u>ish</u>	hi <u>m</u>	ga <u>ve</u>	my	be <u>d</u>
33.	trou <u>ld</u>	to	bu <u>t</u>	pu <u>t</u>	co <u>w</u>
34.	va <u>y</u> t	be <u>d</u>	ga <u>ve</u>	my	hi <u>m</u>
35.	wi <u>es</u>	my	hi <u>m</u>	be <u>d</u>	be
36.	the <u>at</u>	ga <u>ve</u>	be	bu <u>t</u>	be <u>d</u>
37.	ac <u>low</u>	to <u>p</u>	ou <u>t</u>	ba <u>ll</u>	no
38.	bro <u>am</u>	co <u>w</u>	ba <u>ll</u>	no	to <u>p</u>
39.	na <u>ugh</u>	ra <u>n</u>	no	ba <u>ll</u>	co <u>w</u>
40.	fr <u>ool</u>	no	to	bu <u>t</u>	pu <u>t</u>
41.	go <u>ag</u>	to <u>p</u>	co <u>w</u>	ba <u>ll</u>	no
42.	co <u>te</u>	no	to <u>p</u>	to	ou <u>t</u>
43.	po <u>rie</u>	my	be	be <u>d</u>	hi <u>m</u>
44.	du <u>sa</u> ig	hi <u>m</u>	be <u>d</u>	my	ga <u>ve</u>
45.	bloo <u>se</u>	to	pu <u>t</u>	no	bu <u>t</u>
46.	ay <u>s</u>	be <u>d</u>	my	ga <u>ve</u>	hi <u>m</u>
47.	ea <u>lod</u>	be <u>d</u>	be	ga <u>ve</u>	bu <u>t</u>
48.	fo <u>ugh</u>	to	bu <u>t</u>	co <u>w</u>	pu <u>t</u>
49.	ha <u>up</u>	no	ba <u>ll</u>	ra <u>n</u>	co <u>w</u>
50.	zo <u>wn</u>	ou <u>t</u>	no	ba <u>ll</u>	to <u>p</u>

COMPOUND VOWELS - MULTIPLE-CHOICE TEST - LIST A-2

This is a test of how you pronounce unfamiliar English words. At the far left of each page, in every row of the test, there is a short English-like word that you probably have never seen before. On the right, in each row, there are four words that you already know how to say. First decide how you would say the new word on the left, and notice what sound you make for the underlined letter. Then circle the word on the right that has that same sound for its underlined letters.

Here are three examples:

- | | | | | | |
|----|--------------|---------------|--------------|-------------|--------------|
| A. | <u>m</u> ip | h <u>i</u> m | <u>b</u> ed | g <u>o</u> | s <u>a</u> y |
| B. | <u>g</u> an | l <u>e</u> t | <u>c</u> all | <u>d</u> ad | s <u>o</u> |
| C. | <u>p</u> ode | b <u>a</u> by | <u>n</u> o | <u>c</u> ow | m <u>e</u> |

As you work through the test be careful to check which letters are underlined in each word. It could be any one of them or two together.

These are the words you know that will be on the test. Listen to the sound of the underlined letters as you read these words with me.

- | | | | | |
|-------------|--------------|------------|---------------|--------------|
| <u>p</u> ut | <u>g</u> ave | <u>n</u> o | <u>b</u> ut | b <u>e</u> |
| <u>r</u> an | <u>c</u> ow | m <u>y</u> | b <u>a</u> ll | t <u>o</u> p |
| <u>o</u> ut | <u>b</u> ed | t <u>o</u> | <u>h</u> im | |

1. saut no cow ball ran
2. porie be bed my him
3. ays my gave him bed
4. coad cow ball no top
5. frowl top out ball no
6. oan no ball top cow
7. dease bed be but gave
8. smoal cow ball top no
9. pid but him put my
10. ealod but gave bed be
11. manous put to cow but
12. yook but to no put
13. thaim him bed gave my
14. fough put cow but to
15. bloose put but to no
16. vayt him gave bed my
17. zown top ball out no
18. dat bed no put cow
19. baish gave my bed him
20. frool no put but to
21. theat but bed be gave
22. aclow no top out ball
23. haup ball cow ran no
24. wies him be my bed
25. gowl top out ball no

26.	k <u>a</u> idon	b <u>e</u> d	m <u>y</u>	g <u>a</u> ve	h <u>i</u> m
27.	pl <u>o</u> ub	c <u>o</u> w	put	b <u>u</u> t	t <u>o</u>
28.	dr <u>o</u> on	t <u>o</u>	b <u>u</u> t	put	n <u>o</u>
29.	ab <u>i</u> ek	h <u>i</u> m	b <u>e</u> d	m <u>y</u>	b <u>e</u>
30.	c <u>o</u> te	c <u>o</u> w	r <u>a</u> n	n <u>o</u>	t <u>o</u>
31.	c <u>o</u> udry	put	c <u>o</u> w	b <u>u</u> t	t <u>o</u>
32.	na <u>u</u> gh	c <u>o</u> w	b <u>a</u> ll	r <u>a</u> n	n <u>o</u>
33.	po <u>k</u> ay	m <u>y</u>	g <u>a</u> ve	h <u>i</u> m	b <u>e</u> d
34.	bro <u>a</u> m	n <u>o</u>	top	b <u>a</u> ll	c <u>o</u> w
35.	sla <u>u</u> m	b <u>a</u> ll	n <u>o</u>	c <u>o</u> w	r <u>a</u> n
36.	mullo <u>w</u>	out	top	n <u>o</u>	b <u>a</u> ll
37.	fe <u>e</u> l	t <u>o</u>	b <u>e</u>	b <u>e</u> d	h <u>i</u> m
38.	bet <u>a</u> y	h <u>i</u> m	b <u>e</u> d	m <u>y</u>	g <u>a</u> ve
39.	be <u>a</u> se	g <u>a</u> ve	w <u>e</u>	b <u>u</u> t	b <u>e</u> d
40.	go <u>a</u> g	c <u>o</u> w	b <u>a</u> ll	n <u>o</u>	top
41.	cha <u>i</u> g	m <u>y</u>	h <u>i</u> m	b <u>e</u> d	g <u>a</u> ve
42.	trou <u>l</u> d	put	b <u>u</u> t	c <u>o</u> w	t <u>o</u>
43.	du <u>s</u> aig	b <u>e</u> d	h <u>i</u> m	g <u>a</u> ve	m <u>y</u>
44.	cha <u>u</u> se	c <u>o</u> w	b <u>a</u> ll	r <u>a</u> n	n <u>o</u>
45.	com <u>i</u> el	b <u>e</u>	m <u>y</u>	b <u>e</u> d	h <u>i</u> m
46.	mon <u>o</u> od	put	b <u>u</u> t	n <u>o</u>	t <u>o</u>
47.	ma <u>n</u>	g <u>a</u> ve	r <u>a</u> n	b <u>a</u> ll	h <u>i</u> m
48.	y <u>i</u> et	h <u>i</u> m	b <u>e</u> d	m <u>y</u>	b <u>e</u>
49.	ta <u>y</u>	h <u>i</u> m	m <u>y</u>	b <u>e</u> d	g <u>a</u> ve
50.	po <u>l</u> ead	b <u>e</u>	g <u>a</u> ve	b <u>u</u> t	b <u>e</u> d

COMPOUND VOWELS - MULTIPLE-CHOICE TEST - LIST B-1

This is a test of how you pronounce unfamiliar English words. At the far left of each page, in every row of the test, there is a short English-like word that you probably have never seen before. On the right, in each row, there are four words that you already know how to say. First decide how you would say the new word on the left, and notice what sound you make for the underlined letter. Then circle the word on the right that has that same sound for its underlined letters.

Here are three examples:

- A. mip him bed go say
 B. gan let call dad so
 C. pode baby no cow me

As you work through the test be careful to check which letters are underlined in each word. It could be any one of them or two together.

These are the words you know that will be on the test. Listen to the sound of the underlined letters as you read these words with me.

put gave no but be
 ran cow my ball top
out bed to him

1. boys gave bed him to
2. loat cow ball no top
3. chays him my gave bed
4. sprow out top ball no
5. houn put cow to but
6. areak bed be gave but
7. mauf no cow ball ran
8. thood but no put to
9. mief be my bed him
10. ogaim my bed gave him
11. stappow top ball out no
12. trak put cow gave no
13. gies him bed be my
14. poad no ball top cow
15. poom put but to no
16. konay my him gave bed
17. koump cow put but to
18. laip my bed gave him
19. fead but bed be gave
20. paud ball ran cow no
21. blay him bed my gave
22. yoap cow ball no top
23. blue put to no ball
24. poup but to cow put
25. mook no to but put

26.	pr <u>i</u> ent	b <u>e</u> d	m <u>y</u>	b <u>e</u>	h <u>i</u> m
27.	tr <u>o</u> wn	t <u>o</u> p	o <u>u</u> t	b <u>a</u> ll	n <u>o</u>
28.	d <u>e</u> ach	b <u>e</u> d	b <u>u</u> t	b <u>e</u>	g <u>a</u> ve
29.	<u>a</u> col	c <u>o</u> w	b <u>a</u> ll	n <u>o</u>	r <u>a</u> n
30.	t <u>a</u> ise	g <u>a</u> ve	h <u>i</u> m	m <u>y</u>	b <u>e</u> d
31.	fr <u>e</u> an	b <u>u</u> t	b <u>e</u> d	b <u>e</u>	g <u>a</u> ve
32.	w <u>o</u> uth	c <u>o</u> w	b <u>u</u> t	p <u>u</u> t	t <u>o</u>
33.	s <u>u</u> nt	r <u>a</u> n	b <u>e</u>	h <u>i</u> m	p <u>u</u> t
34.	sp <u>o</u> ws	n <u>o</u>	b <u>a</u> ll	t <u>o</u> p	o <u>u</u> t
35.	h <u>a</u> uge	b <u>a</u> ll	n <u>o</u>	r <u>a</u> n	c <u>o</u> w
36.	slo <u>o</u> t	n <u>o</u>	t <u>o</u>	b <u>u</u> t	p <u>u</u> t
37.	bl <u>a</u> ing	b <u>e</u> d	m <u>y</u>	g <u>a</u> ve	h <u>i</u> m
38.	to <u>a</u> ng	n <u>o</u>	b <u>a</u> ll	t <u>o</u> p	c <u>o</u> w
39.	z <u>i</u> egle	b <u>e</u> d	m <u>y</u>	b <u>e</u>	h <u>i</u> m
40.	onch <u>a</u> y	h <u>i</u> m	b <u>e</u> d	m <u>y</u>	g <u>a</u> ve
41.	fowt	n <u>o</u>	b <u>a</u> ll	o <u>u</u> t	t <u>o</u> p
42.	b <u>i</u> esh	h <u>i</u> m	b <u>e</u> d	m <u>y</u>	b <u>e</u>
43.	to <u>u</u> l	p <u>u</u> t	b <u>u</u> t	c <u>o</u> w	t <u>o</u>
44.	s <u>a</u> w	b <u>a</u> ll	n <u>o</u>	t <u>o</u>	r <u>a</u> n
45.	bo <u>a</u> se	n <u>o</u>	c <u>o</u> w	b <u>a</u> ll	t <u>o</u> p
46.	duc <u>a</u> y	m <u>y</u>	h <u>i</u> m	b <u>e</u> d	g <u>a</u> ve
47.	ra <u>i</u> tel	g <u>a</u> ve	b <u>e</u> d	h <u>i</u> m	m <u>y</u>
48.	vo <u>o</u> p	p <u>u</u> t	b <u>u</u> t	n <u>o</u>	t <u>o</u>
49.	<u>a</u> p	n <u>o</u>	b <u>a</u> ll	c <u>o</u> w	r <u>a</u> n
50.	che <u>a</u> m	b <u>u</u> t	b <u>e</u>	g <u>a</u> ve	b <u>e</u> d

COMPOUND VOWELS - MULTIPLE-CHOICE TEST - LIST B-2

This is a test of how you pronounce unfamiliar English words. At the far left of each page, in every row of the test, there is a short English-like word that you probably have never seen before. On the right, in each row, there are four words that you already know how to say. First decide how you would say the new word on the left, and notice what sound you make for the underlined letter. Then circle the word on the right that has that same sound for its underlined letters.

Here are three examples:

- A. mip him bed go say
 B. gan let call dad so
 C. pode baby no cow me

As you work through the test be careful to check which letters are underlined in each word. It could be any one of them or two together.

These are the words you know that will be on the test. Listen to the sound of the underlined letters as you read these words with me.

put gave no but be
 ran cow my ball bed
 to him out bed

1. onchay gave him my bed
2. aucol no ran cow ball
3. spows out ball top no
4. ogaim him my bed gave
5. prient my bed him be
6. frean be but gave bed
7. biesh my be bed him
8. trak gave no put cow
9. stappow no top ball out
10. paud cow no ball ran
11. raitel him my gave bed
12. mauf ball ran cow no
13. trown ball no out top
14. thood put to no but
15. deach gave but bed be
16. ducay gave my him bed
17. blue no ball to put
18. voop but no to put
19. aup ran ball no cow
20. toul to put cow but
21. blaing my him bed gave
22. fead be gave bed but
23. chays bed gave him my
24. loat ball top no cow
25. sloot put to no but

26.	kon <u>ay</u>	g <u>ave</u>	my	bed	him
27.	sunt	him	put	be	ran
28.	taise	my	gave	bed	him
29.	po <u>ad</u>	ball	cow	top	no
30.	wou <u>th</u>	put	to	cow	but
31.	cheam	bed	gave	be	but
32.	mook	to	put	no	but
33.	hau <u>ge</u>	cow	no	ran	ball
34.	to <u>ang</u>	ball	no	cow	top
35.	m <u>ief</u>	him	be	bed	my
36.	bo <u>ys</u>	to	gave	him	bed
37.	fo <u>wt</u>	ball	top	no	out
38.	are <u>ak</u>	be	gave	bed	but
39.	saw	ran	no	ball	to
40.	po <u>up</u>	cow	put	but	to
41.	bo <u>ase</u>	top	no	cow	ball
42.	bl <u>ay</u>	my	him	bed	gave
43.	po <u>om</u>	no	but	to	put
44.	ko <u>ump</u>	but	to	put	cow
45.	g <u>ies</u>	my	him	be	bed
46.	hou <u>n</u>	cow	to	put	but
47.	yo <u>ap</u>	ball	top	no	cow
48.	la <u>ip</u>	bed	gave	my	him
49.	zie <u>gle</u>	him	my	be	bed
50.	sprow	no	ball	top	out

Appendix D

Pilot Study E

Waterloo Subject's Code Number, Sex, Grade Level,
Reading Score, and IQ Score

Waterloo Subject's Code Number, Sex, Grade Level,
Reading Grade Level and IQ Score

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>Reading Score*</u>	<u>IQ Score*</u>
1	M	2	3.1	107
2	M	2	3.4	124
3	M	2	3.0	116
4	M	2	3.2	109
5	F	2	3.4	103
6	F	2	3.2	109
7	F	2	3.4	110
8	F	2	3.0	No score
9	M	2	2.5	83
10	M	2	2.4	116
11	M	2	2.0	106
12	M	2	1.9	88
13	F	2	2.6	109
14	F	2	2.6	115
15	F	2	2.3	93
16	F	2	2.2	97
17	M	4	7.9	129
18	M	4	5.4	100
19	M	4	6.2	127

* See Appendix F

Waterloo Subject's Code Number, Sex, Grade Level,
Reading Grade Level and IQ Score, cont.

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>Reading Score*</u>	<u>IQ Score*</u>
20	M	4	4.7	117
21	F	4	6.2	131
22	F	4	5.8	118
23	F	4	5.0	106
24	F	4	4.8	109
25	M	4	4.5	110
26	M	4	3.8	87
27	M	4	3.8	105
28	M	4	2.7	70
29	F	4	4.6	97
30	F	4	4.0	91
31	F	4	3.7	111
32	F	4	3.5	No score
33	M	6	9.3	118
34	M	6	9.0	116
35	M	6	8.7	102
36	M	6	6.9	94
37	F	6	10.4	112
38	F	6	10.3	106

* See Appendix F

Waterloo Subject's Code Number, Sex, Grade Level,
Reading Grade Level and IQ Score, cont.

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>Reading Score*</u>	<u>IQ Score*</u>
39	F	6	8.6	112
40	F	6	7.6	106
41	M	6	6.5	120
42	M	6	6.4	104
43	M	6	6.2	96
44	M	6	5.7	94
45	F	6	6.4	114
46	F	6	6.2	113
47	F	6	6.0	99
48	F	6	4.3	88

* See Appendix F

Appendix E

The Study

Subject's Code Number, Sex, Grade Level, School,
Reading Score and IQ Score

Investigation Two: Subject's Code Number, Sex,
Grade Level, Reading Score and IQ Score

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score*</u>	<u>IQ Score*</u>
1	M	2	Seneca	3.8	119
2	M	2	Seneca	2.9	101
3	M	2	Seneca	2.7	98
4	M	2	Seneca	2.5	95
5	F	2	Seneca	3.9	116
6	F	2	Seneca	4.0	145
7	M	2	Seneca	2.6	131
8	M	2	Seneca	2.4	103
9	F	2	Seneca	2.1	100
10	F	2	Seneca	2.8	107
11	M	2	Seneca	2.2	97
12	F	2	Seneca	2.1	101
13	M	2	Seneca	2.1	124
14	M	4	Seneca	2.1	97
15	M	4	Seneca	4.3	110
16	M	4	Seneca	3.0	95
17	M	4	Seneca	4.0	101
18	M	4	Seneca	5.1	104
19	M	4	Seneca	5.1	113

*See Appendix F

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
20	M	4	Seneca	6.2	117
21	F	4	Seneca	6.2	106
22	F	4	Seneca	3.4	105
23	M	4	Seneca	4.2	113
24	F	4	Seneca	4.5	110
25	F	4	Seneca	6.5	150
26	F	6	Seneca	8.7	127
27	F	6	Seneca	6.5	115
28	M	6	Seneca	8.6	No score
29	M	6	Seneca	8.4	122
30	M	6	Seneca	6.7	96
31	F	6	Seneca	6.4	113
32	M	6	Seneca	7.7	116
33	F	6	Seneca	9.1	134
34	F	6	Seneca	6.0	122
35	M	6	Seneca	3.6	109
36	M	6	Seneca	5.7	96
37	M	6	Seneca	8.0	123
38	M	6	Seneca	7.0	110
39	F	6	Seneca	7.0	121
40	F	6	Seneca	5.4	107
41	M	6	Seneca	3.8	92
42	F	6	Seneca	7.5	115
43	M	6	Seneca	7.8	112
44	F	6	Seneca	7.8	120

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
45	F	6	Seneca	7.2	117
46	M	6	Seneca	6.2	105
47	F	6	Seneca	6.3	96
48	F	6	Seneca	6.2	114
49	F	6	Seneca	8.2	120
50	F	6	Seneca	8.0	116
51	M	6	Seneca	6.5	106
52	F	6	Seneca	8.7	115
53	M	6	Seneca	5.4	98
54	M	6	Seneca	6.8	112
55	F	6	Seneca	6.7	115
56	F	6	Seneca	7.4	116
57	F	6	Seneca	8.3	130
58	F	6	Seneca	5.5	102
59	F	4	Seneca	5.6	120
60	M	4	Seneca	5.0	115
61	M	4	Seneca	4.3	117
62	M	4	Seneca	5.9	120
63	F	4	Seneca	6.2	114
64	F	4	Seneca	3.5	109
65	M	4	Seneca	4.7	108
66	M	4	Seneca	5.7	111
67	F	4	Seneca	4.8	95
68	M	4	Seneca	4.2	98

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
69	M	4	Seneca	4.5	107
70	F	4	Seneca	4.4	103
71	F	4	Seneca	5.2	126
72	F	4	Seneca	4.8	108
73	F	4	Seneca	5.4	113
74	F	4	Seneca	4.3	109
75	M	4	Seneca	5.5	116
76	M	4	Seneca	4.8	128
77	F	4	Seneca	4.5	104
78	F	4	Seneca	4.2	112
79	M	4	Seneca	3.3	87
80	F	4	Seneca	3.9	96
81	M	4	Seneca	4.6	98
82	M	4	Seneca	3.6	86
83	F	2	Seneca	4.1	131
84	M	2	Seneca	4.1	141
85	F	2	Seneca	3.9	139
86	M	2	Seneca	3.7	116
87	M	2	Seneca	3.5	114
88	F	2	Seneca	3.5	122
89	M	2	Seneca	3.2	120
90	F	2	Seneca	3.1	112
91	M	2	Seneca	2.9	139
92	M	2	Seneca	2.8	131

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
93	M	2	Seneca	2.8	90
94	M	2	Seneca	2.8	137
95	F	2	Seneca	2.7	114
96	F	2	Seneca	2.7	105
97	F	2	Seneca	2.6	108
98	F	2	Seneca	2.6	119
99	F	2	Seneca	2.6	103
100	M	2	Seneca	2.5	131
101	M	2	Seneca	2.5	104
102	M	2	Seneca	2.4	108
103	M	2	Seneca	2.4	119
104	M	2	Seneca	1.9	96
105	F	2	Seneca	1.7	91
106	M	2	Seneca	1.5	107
107	F	6	Seneca	5.1	106
108	F	6	Seneca	6.6	108
109	M	6	Seneca	6.0	110
110	F	2	Cedarburg	2.6	112
111	M	2	Cedarburg	2.1	100
112	M	2	Cedarburg	2.6	97
113	F	2	Cedarburg	3.9	93
114	F	2	Cedarburg	2.0	93
115	M	2	Cedarburg	3.1	109
116	F	2	Cedarburg	3.9	110

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
117	M	2	Cedarburg	2.0	105
118	M	2	Cedarburg	3.8	112
119	M	2	Cedarburg	2.3	114
120	M	2	Cedarburg	4.3	104
121	F	2	Cedarburg	2.6	118
122	M	2	Cedarburg	3.6	109
123	M	2	Cedarburg	3.7	114
124	F	2	Cedarburg	2.6	101
125	F	2	Cedarburg	4.1	119
126	M	2	Cedarburg	1.5	92
127	F	2	Cedarburg	3.4	109
128	F	2	Cedarburg	1.9	93
129	M	2	Cedarburg	2.5	103
130	F	2	Cedarburg	1.8	99
131	M	2	Cedarburg	3.1	104
132	F	2	Cedarburg	3.3	116
133	F	2	Cedarburg	2.6	104
134	F	2	Cedarburg	1.6	104
135	M	2	Cedarburg	3.4	119
136	M	2	Cedarburg	1.9	104
137	F	2	Cedarburg	3.8	123
138	F	2	Cedarburg	2.2	123
139	M	2	Cedarburg	1.5	111
140	F	2	Cedarburg	3.3	116

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
141	M	2	Cedarburg	1.5	No score
142	F	2	Cedarburg	1.7	116
143	M	2	Cedarburg	2.2	130
144	F	2	Cedarburg	1.7	No score
145	F	2	Cedarburg	2.5	115
146	M	2	Cedarburg	1.8	95
147	M	2	Cedarburg	1.6	87
148	F	2	Cedarburg	3.4	115
149	F	2	Cedarburg	2.9	118
150	F	2	Cedarburg	3.8	116
151	F	2	Cedarburg	1.7	110
152	F	2	Cedarburg	1.5	106
153	F	2	Cedarburg	1.9	98
154	F	2	Cedarburg	2.2	112
155	M	2	Cedarburg	1.9	113
156	F	2	Cedarburg	No score	No score
157	M	2	Cedarburg	1.5	109
158	F	2	Cedarburg	2.1	122
159	M	2	Cedarburg	3.4	128
160	F	2	Cedarburg	1.5	103
161	M	2	Cedarburg	1.8	114
162	F	2	Cedarburg	2.0	124
163	M	2	Cedarburg	1.7	107
164	F	2	Cedarburg	4.3	127

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
165	M	2	Cedarburg	1.9	117
166	F	2	Cedarburg	1.9	132
167	M	4	Cedarburg	5.0	104
168	F	4	Cedarburg	4.6	106
169	F	4	Cedarburg	No score	No score
170	F	4	Cedarburg	3.2	97
171	F	4	Cedarburg	3.4	87
172	F	4	Cedarburg	5.1	102
173	M	4	Cedarburg	2.9	96
174	M	4	Cedarburg	5.4	115
175	F	4	Cedarburg	4.9	116
176	M	4	Cedarburg	4.4	99
177	F	4	Cedarburg	3.6	94
178	M	4	Cedarburg	6.0	107
179	M	4	Cedarburg	4.2	108
180	M	4	Cedarburg	3.1	86
181	F	4	Cedarburg	6.3	117
182	M	4	Cedarburg	3.3	97
183	F	4	Cedarburg	5.9	104
184	F	4	Cedarburg	5.0	114
185	F	4	Cedarburg	4.9	87
186	F	4	Cedarburg	5.3	107
187	M	4	Cedarburg	4.2	84
188	F	4	Cedarburg	2.1	83

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
189	M	4	Cedarburg	3.4	94
190	F	4	Cedarburg	4.8	106
191	F	4	Cedarburg	4.7	115
192	F	4	Cedarburg	5.1	96
193	M	4	Cedarburg	6.1	119
194	M	4	Cedarburg	4.4	97
195	M	4	Cedarburg	No score	No score
196	M	4	Cedarburg	6.1	122
197	M	4	Cedarburg	3.4	81
198	M	4	Cedarburg	5.9	114
199	F	4	Cedarburg	6.7	129
200	M	4	Cedarburg	5.4	112
201	M	4	Cedarburg	4.4	115
202	M	4	Cedarburg	5.2	109
203	M	4	Cedarburg	4.7	100
204	F	4	Cedarburg	4.1	100
205	M	4	Cedarburg	1.7	64
206	M	4	Cedarburg	6.1	119
207	F	4	Cedarburg	5.1	101
208	M	4	Cedarburg	3.8	91
209	F	4	Cedarburg	5.0	102
210	M	4	Cedarburg	5.4	118
211	F	4	Cedarburg	6.5	124
212	F	4	Cedarburg	3.3	104

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
213	M	4	Cedarburg	3.2	100
214	M	4	Cedarburg	2.4	70
215	M	4	Cedarburg	4.7	99
216	F	4	Cedarburg	5.3	116
217	F	4	Cedarburg	5.9	118
218	F	4	Cedarburg	4.8	107
219	M	4	Cedarburg	3.8	103
220	F	4	Cedarburg	5.8	121
221	M	4	Cedarburg	6.7	125
222	M	4	Cedarburg	4.8	109
223	M	4	Cedarburg	3.4	101
224	F	4	Cedarburg	2.0	100
225	M	4	Cedarburg	4.8	89
226	F	4	Cedarburg	3.4	103
227	F	6	Cedarburg	6.3	88
228	M	6	Cedarburg	6.4	93
229	F	6	Cedarburg	7.2	111
230	F	6	Cedarburg	6.9	118
231	F	6	Cedarburg	6.5	104
232	M	6	Cedarburg	7.9	129
233	F	6	Cedarburg	7.2	103
234	F	6	Cedarburg	7.1	122
235	M	6	Cedarburg	3.4	89
236	M	6	Cedarburg	7.8	96

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
237	F	6	Cedarburg	7.8	121
238	F	6	Cedarburg	5.7	99
239	F	6	Cedarburg	6.2	104
240	M	6	Cedarburg	6.6	103
241	F	6	Cedarburg	7.4	118
242	M	6	Cedarburg	6.0	No score
243	F	6	Cedarburg	8.0	112
244	M	6	Cedarburg	6.5	103
245	M	6	Cedarburg	7.9	139
246	F	6	Cedarburg	10.0	127
247	F	6	Cedarburg	8.1	119
248	M	6	Cedarburg	8.2	112
249	M	6	Cedarburg	5.7	86
250	M	6	Cedarburg	6.8	121
251	M	6	Cedarburg	7.5	104
252	M	6	Cedarburg	8.2	114
253	M	6	Cedarburg	4.9	89
254	M	6	Cedarburg	No score	No score
255	M	6	Cedarburg	7.3	No score
256	F	6	Cedarburg	8.3	120
257	M	6	Cedarburg	5.6	100
258	M	6	Cedarburg	6.2	114
259	M	6	Cedarburg	8.7	115
260	M	6	Cedarburg	5.5	114

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
261	M	6	Cedarburg	5.8	98
262	M	6	Cedarburg	4.2	96
263	F	6	Cedarburg	7.1	125
264	F	6	Cedarburg	9.4	133
265	F	6	Cedarburg	8.5	117
266	F	6	Cedarburg	8.2	110
267	M	6	Cedarburg	6.0	104
268	F	6	Cedarburg	6.9	93
269	M	6	Cedarburg	8.2	105
270	M	6	Cedarburg	4.4	111
271	M	6	Cedarburg	7.8	115
272	M	6	Cedarburg	6.4	95
273	M	6	Cedarburg	8.8	134
274	F	6	Cedarburg	7.0	114
275	F	6	Cedarburg	9.0	120
276	M	6	Cedarburg	6.0	91
277	F	6	Cedarburg	5.5	100
278	M	6	Cedarburg	4.9	100
279	F	6	Cedarburg	9.2	120
280	F	6	Cedarburg	4.9	100
281	F	6	Cedarburg	5.5	100
282	F	6	Cedarburg	8.4	117
283	M	6	Cedarburg	5.6	106
284	F	6	Cedarburg	No score	130

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
285	M	6	Cedarburg	No score	135
286	F	6	Cedarburg	5.6	115
287	M	4	Racine	2.5	90
288	M	4	Racine	No score	No score
289	M	4	Racine	No score	125
290	M	4	Racine	2.0	101
291	M	4	Racine	3.3	91
292	M	4	Racine	No score	103
293	M	4	Racine	2.1	105
294	M	4	Racine	2.1	110
295	M	4	Racine	3.0	92
296	M	4	Racine	2.3	99
297	M	4	Racine	2.9	101
298	M	4	Racine	No score	77
299	M	4	Racine	2.5	98
300	M	4	Racine	1.7	105
301	F	4	Racine	No score	113
302	F	4	Racine	No score	104
303	F	4	Racine	2.4	77
304	F	4	Racine	4.0	106
305	F	4	Racine	2.8	101
306	F	4	Racine	5.1	126
307	F	4	Racine	5.7	136
308	F	4	Racine	5.1	115

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
309	F	4	Racine	4.0	114
310	F	4	Racine	2.8	109
311	F	4	Racine	No score	104
312	M	6	Racine	5.2	103
313	M	6	Racine	No score	89
314	M	6	Racine	5.4	105
315	M	6	Racine	No score	99
316	M	6	Racine	5.1	102
317	M	6	Racine	5.6	95
318	M	6	Racine	6.2	No score
319	M	6	Racine	6.4	106
320	M	6	Racine	5.1	80
321	M	6	Racine	9.6	117
322	M	6	Racine	4.6	89
323	M	6	Racine	9.0	92
324	M	6	Racine	4.2	90
325	M	6	Racine	5.2	85
326	M	6	Racine	No score	No score
327	F	6	Racine	4.1	98
328	F	6	Racine	5.1	78
329	F	6	Racine	8.0	108
330	F	6	Racine	7.8	110
331	F	6	Racine	4.9	85
332	F	6	Racine	4.6	93

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
333	F	6	Racine	4.8	95
334	F	6	Racine	5.1	105
335	F	6	Racine	No score	No score
336	M	2	Racine	1.8	116
337	M	2	Racine	1.5	93
338	M	2	Racine	No score	No score
339	M	2	Racine	No score	100
340	M	2	Racine	1.3	85
341	M	2	Racine	1.3	86
342	M	2	Racine	1.9	120
343	M	2	Racine	1.6	100
344	M	2	Racine	1.5	97
345	M	2	Racine	0.5	76
346	M	2	Racine	1.5	109
347	M	2	Racine	1.6	93
348	M	2	Racine	No score	101
349	M	2	Racine	1.7	95
350	M	2	Racine	1.3	96
351	M	2	Racine	1.6	103
352	F	2	Racine	1.9	103
353	F	2	Racine	1.7	101
354	F	2	Racine	1.8	111
355	F	2	Racine	1.4	104
356	F	2	Racine	1.6	123

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
357	F	2	Racine	1.6	124
358	F	2	Racine	1.0	101
359	F	2	Racine	1.5	94
360	F	2	Racine	1.5	99
361	F	2	Racine	2.0	127
362	M	2	Racine	1.8	130
363	F	2	Racine	1.5	110
364	F	2	Racine	1.5	119
365	M	2	Racine	1.8	121
366	F	2	Racine	2.0	127
367	M	2	Racine	1.7	108
368	M	2	Racine	1.3	117
369	F	2	Racine	1.5	95
370	F	2	Racine	1.7	119
371	F	2	Racine	1.8	114
372	F	2	Racine	1.7	105
373	F	2	Racine	1.7	95
374	M	2	Racine	2.6	137
375	F	2	Racine	1.9	115
376	M	2	Racine	1.6	96
377	F	2	Racine	1.5	112
378	M	2	Racine	1.7	126
379	F	2	Racine	2.2	114
380	M	2	Racine	1.6	115

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
381	M	2	Racine	1.4	124
382	F	2	Racine	2.6	124
383	M	2	Racine	2.7	120
384	F	2	Racine	No score	102
385	F	6	Racine	7.1	123
386	M	6	Racine	7.5	No score
387	F	6	Racine	6.4	135
388	M	6	Racine	5.6	97
389	M	6	Racine	8.0	97
390	M	6	Racine	6.7	96
391	M	6	Racine	5.9	108
392	M	6	Racine	5.1	106
393	F	6	Racine	7.3	110
394	F	6	Racine	5.9	106
395	F	6	Racine	5.1	106
396	M	6	Racine	6.9	108
397	M	6	Racine	6.6	112
398	F	6	Racine	6.0	107
399	M	6	Racine	6.9	98
400	F	6	Racine	8.5	117
401	M	6	Racine	6.6	99
402	M	6	Racine	7.1	122
403	M	6	Racine	6.6	111
404	M	6	Racine	6.7	117

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
405	F	6	Racine	7.1	99
406	M	6	Racine	5.2	108
407	F	6	Racine	7.1	101
408	F	6	Racine	5.9	96
409	F	6	Racine	8.0	127
410	M	6	Racine	6.9	113
411	M	6	Racine	6.0	100
412	F	6	Racine	7.1	127
413	F	6	Racine	5.7	97
414	M	6	Racine	5.1	94
415	M	6	Racine	6.2	105
416	M	6	Racine	6.6	103
417	M	6	Racine	5.7	89
418	M	6	Racine	8.5	117
419	F	6	Racine	6.0	124
420	M	6	Racine	3.8	No score
421	F	6	Racine	4.1	105
422	M	6	Racine	6.9	No score
423	F	6	Racine	5.6	102
424	M	6	Racine	8.0	100
425	F	6	Racine	6.6	116
426	M	4	Racine	3.7	110
427	M	4	Racine	4.7	100
428	M	4	Racine	No score	68

<u>Code</u>	<u>Sex</u>	<u>Grade</u>	<u>School</u>	<u>Reading Score</u>	<u>IQ Score</u>
429	M	4	Racine	4.4	104
430	M	4	Racine	3.8	121
431	M	4	Racine	No score	136
432	M	4	Racine	2.7	124
433	M	4	Racine	3.6	118
434	M	4	Racine	5.1	127
435	M	4	Racine	3.8	No score
436	M	4	Racine	3.8	110
437	M	4	Racine	4.4	120
438	M	4	Racine	3.7	115
439	M	4	Racine	3.7	106
440	M	4	Racine	4.0	112
441	M	4	Racine	3.6	112
442	M	4	Racine	2.3	117
443	M	4	Racine	No score	86
444	M	4	Racine	3.8	116
445	F	4	Racine	No score	141
446	F	4	Racine	5.7	125
447	F	4	Racine	3.3	111
448	F	4	Racine	2.9	120
449	F	4	Racine	3.3	121
450	F	4	Racine	3.6	133
451	F	4	Racine	3.6	127
452	F	4	Racine	4.7	122
453	F	4	Racine	4.4	140

Appendix F

Summary of Reading Achievement Tests, Intelligence Tests
and Dates of Administration to the Subjects
of Pilot Studies A and B and The Study

Tests

<u>School</u>	<u>Reading Achievement Test</u>	<u>Date of Testing</u>	<u>Grade Level at Testing</u>	<u>IQ Test</u>	<u>Date of Testing</u>
<u>Waterloo</u>					
2	Gates McGinty Primary A	5/68	(1)	Lorge-Thorndike	5/68
4	Nelson Reading A	5/68	(3)	Lorge-Thorndike	5/68
6	Nelson Reading A	5/68	(5)	Lorge-Thorndike	5/68
<u>Seneca</u>					
2	SRA	1/69	(2)	Otis Quick	3/69
4	Iowa Basic	2/69	(4)	Hermion-Nelson	4/68
6	Iowa Basic	2/69	(6)	Hermion-Nelson	4/68

Tests, cont.

<u>School</u>	<u>Reading Achievement Test</u>	<u>Date of Testing</u>	<u>Grade Level at Testing</u>	<u>IQ Test</u>	<u>Date of Testing</u>
<u>Cedarburg</u>					
2	Stanford Achievement	10/68	(2)	Primary Abilities	9/67
4	Iowa Basic	10/68	(4)	Lorge- Thorndike	10/68
6	Iowa Basic	10/68	(6)	Lorge- Thorndike	10/68
<u>Racine</u>					
2	Stanford Achievement	10/68	(2)	Kuhlman- Anderson	12/68
4	Stanford Achievement	10/67	(3)	Kuhlman- Anderson	12/68
6	Stanford Achievement	12/68	(6)	Kuhlman- Anderson	12/67

Appendix G

F Values of Main Effects and Interactions
for Analysis One

Appendix G

F Values of Main Effects and Interactions for Analysis One

Source of Variation	Degrees of Freedom	Mean Squares	F Values	P less than
<u>Between</u>				
Grade Level	2,400	1042873	93.2776	.01
Sex	1,400	29010.7	2.5948	NS
Reading Level	1,400	466808	41.7527	.01
Community Type	2,400	72453	6.4804	.01
G x S	2,400	3091	.2765	NS
G x R	2,400	3369	.3012	NS
*G x C	4,400	40786	3.6480	.01
S x R	1,400	391	.0350	NS
S x C	2,400	26078	2.3325	NS
R x C	2,400	17646	1.5783	NS
G x S x R	2,400	10130	.9061	NS
G x S x C	4,400	6130	.5483	NS
G x R x C	4,400	7887	.7054	NS
S x R x C	2,400	30788	2.7538	NS
G x S x R x C	4,400	13962	1.2488	NS
<u>Wholly Within</u>				
Vowel Clusters	1,400	96795	340.8036	.01
Response Type	1,400	13090	2.3539	NS
V C x T	1,400	40904	199.4929	.01
<u>Between by Within</u>				
Grade x V C	2,400	2372.6	8.3535	.01
Sex x V C	1,400	530.6	1.8686	NS
Reading Level x V C	1,400	1899.8	6.6888	.01

Appendix G (Cont.)

Source of Variation	Degrees of Freedom	Mean Squares	F Values	P less than
Community x V C	2,400	855.7	3.0128	NS
G x T	2,400	439053.9	78.9498	.01
S x T	1,400	27065.7	4.8669	NS
R x T	1,400	230587.6	41.4638	.01
C x T	2,400	36937.2	6.6421	.01
G x VC x T	2,400	3937.2	19.2022	.01
S x VC x T	1,400	102	.4976	NS
R x VC x T	1,400	1005	4.9015	NS
C x VC x T	2,400	1109.4	5.4108	.01
G x S x VC	2,400	463.6	1.6321	NS
G x R x VC	2,400	430.3	1.5150	NS
G x C x VC	4,400	503.5	1.7728	NS
S x R x VC	1,400	389.8	1.3725	NS
S x C x VC	2,400	399	1.4049	NS
R x C x VC	2,400	125.1	0.4403	NS
G x S x T	2,400	5706.9	1.0262	NS
G x R x T	2,400	1986.5	.3572	NS
G x C x T	4,400	12747.3	2.2922	NS
S x R x T	1,400	173	.0391	NS
S x C x T	2,400	18759.5	3.3733	NS
R x C x T	2,400	6470.4	1.1635	NS
G x S x VC x T	2,400	241.6	1.1782	NS
G x R x VC x T	2,400	288.1	1.4055	NS
G x C x VC x T	4,400	465.8	2.2719	NS
S x R x VC x T	1,400	114.1	.5863	NS

Appendix G (Cont.)

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Source of Variation	Degrees of Freedom	Mean Squares	F Values	P less than
S x C x VC x T	2,400	317.6	1.5499	NS
R x S x VC x T	2,400	150.9	.7361	NS
G x S x R x VC	2,400	177.3	.6242	NS
G x S x C x VC	4,400	166.3	.5854	NS
G x R x C x VC	4,400	255.5	.8997	NS
S x R x C x VC	2,400	291.6	1.0266	NS
G x S x R x T	2,400	1735.1	.3120	NS
G x S x C x T	4,400	1765.7	.3975	NS
G x R x C x T	4,400	4545.2	.8173	NS
S x R x C x T	2,400	19191.6	3.4810	NS
G x S x R x VC x T	2,400	262.8	1.2818	NS
G x S x C x VC x T	4,400	168.3	.8208	NS
G x R x C x VC x T	4,400	222.2	1.0836	NS
S x R x C x VC x T	2,400	291.8	1.4233	NS
G x S x R x C x VC	4,400	363.2	1.2787	NS
G x S x R x C x T	4,400	3512.4	.6316	NS
G x S x R x C x VC x T	4,400	159.1	.7761	NS

Appendix H

F Values of Main Effects and Interactions
for Analysis Two

Appendix H

F Values of Main Effects and Interactions for Analysis Two

Source of Variation	Degrees of Freedom	Mean Squares	F Values	P less than
<u>Between</u>				
Grade	2,400	703865.82	72.439	.01
Sex	1,400	31711.21	3.264	NS
Reading Level	1,400	373501.70	38.439	.01
Community Type	2,400	76242.73	7.847	.01
G x S	2,400	9833.52	1.012	NS
G x R	2,400	13340.55	1.373	NS
G x C	4,400	33367.60	3.434	.01
S x R	1,400	43.62	.0045	NS
S x C	2,400	21429.27	2.205	NS
R x C	2,400	15426.98	1.588	NS
G x S x R	2,400	7063.19	.727	NS
G x S x C	4,400	7094.43	.730	NS
G x R x C	4,400	5440.67	.560	NS
S x R x C	2,400	20370.52	2.096	NS
G x S x R x C	4,400	8873.20	.913	NS
<u>Wholly Within</u>				
Vowel Cluster	1,400	215119.39	317.2068	.01
Response Type	1,400	5404639.56	528.9131	.01
VC x T	1,400	4866364.50	1803.7156	.01
<u>Between x Within</u>				
G x VC	2,400	13237.63	19.5196	.01
S x VC	1,400	966.46	1.4250	NS

Appendix H (Cont.)

Source of Variation	Degrees of Freedom	Mean Squares	F Values	P less than
R x VC	1,400	1547.97	2.2825	NS
C x VC	2,400	882.77	1.3016	NS
G x T	2,400	675732.22	66.1290	.01
S x T	1,400	2145.23	.2099	NS
R x T	1,400	164410.35	16.0897	.01
C x T	2,400	127006.53	12.4292	.01
G x VC x T	2,400	109272.60	40.5087	.01
S x VC x T	1,400	6377.83	2.3639	NS
R x VC x T	1,400	60088.49	22.2717	.01
C x VC x T	2,400	19321.37	7.1614	.01
G x S x VC	2,400	1118.41	1.6491	NS
G x R x VC	2,400	423.89	.6250	NS
G x C x VC	4,400	2110.82	3.1124	NS
S x R x VC	1,400	930.88	1.3726	NS
S x C x VC	2,400	3239.42	4.7767	.01
R x C x VC	2,400	321.98	.4747	NS
G x S x T	2,400	724.69	.0709	NS
G x R x T	2,400	7891.56	.7723	NS
G x C x T	4,400	39480.82	3.8637	.01
S x R x T	1,400	18600.25	1.8203	NS
S x C x T	2,400	19115.55	1.8707	NS
R x C x T	2,400	7250.10	.7095	NS
G x S x VC x T	2,400	3162.13	1.2776	NS
G x R x VC x T	2,400	2558.28	.9482	NS

Appendix H (Cont.)

Source of Variation	Degrees of Freedom	Mean Squares	F Values	P less than
G x C x VC x T	4,400	3941.57	1.4609	NS
S x R x VC x T	1,400	540.37	.2002	NS
S x C x VC x T	2,400	3195.59	1.1844	NS
R x C x VC x T	2,400	2347.00	.8699	NS
G x S x R x VC	2,400	683.37	1.0076	NS
G x S x C x VC	4,400	643.59	.9490	NS
G x R x C x VC	4,400	647.75	.9949	NS
S x R x C x VC	2,400	988.55	1.4576	NS
G x S x R x T	2,400	3500.44	.3426	NS
G x S x C x T	4,400	6624.72	.6483	NS
G x R x C x T	4,400	7085.38	.6934	NS
S x R x C x T	2,400	33523.92	3.2807	NS
G x S x R x VC x T	2,400	1822.98	.6797	NS
G x S x C x VC x T	4,400	3240.20	1.2009	NS
G x R x C x VC x T	4,400	3576.80	1.3257	NS
S x R x C x VC x T	2,400	4894.48	1.8141	NS
G x S x R x C x VC	4,400	484.98	.7151	NS
G x S x R x C x T	4,400	12283.64	1.2021	NS
G x S x R x C x VC x T	4,400	4633.5462	1.7174	NS

Appendix I

Certain assumptions underlie the use of analysis of variance. They include: normality in distribution of errors, homogeneity of variance, and independence of errors within and across treatment combinations. Hayes, Box, (318-335) and Geisser and Greenhouse (885-891) have found that violation of these assumptions can be accommodated by the reduction of degrees of freedom. They recommend a conservative F test by reducing the degrees of freedom, and Geisser-Greenhouse have developed a procedure for this. Edwards supports this concept (p. 102) by advocating a conservative test using a maximum reduction in the number of degrees of freedom.

Using the Geisser-Greenhouse corrections on degrees of freedom with the Within and Between x Within portions of the analyses (see Appendices G and H), this investigator accounted for any possible violations of the underlying ANOVA assumptions. Geisser-Greenhouse corrections, however, were not used with the Between cells components of the analyses. However, it can be seen from the following two tables that the only violation of the assumption of homogeneity of variance was with the Grade Six cells on both analyses.

Standard Deviations in Analysis One (Type)

Source	N	Means	Standard Deviations	Variance
Grade 2	133	.18670+03	.13022+03	.16956+05
Grade 4	142	.67993+02	.11623+03	.13509+05
Grade 6	161	.20478+02	.94903+02	.90066+04
Male	240	.93250+02	.13610+03	.18524+05
Female	196	.78641+02	.12855+03	.16524+05
Low Reading	202	.12304+03	.13904+03	.19332+05
High Reading	234	.55248+02	.11851+03	.14045+05
Suburban	162	.64222+02	.12096+03	.14631+05
Urban	165	.10488+03	.14609+03	.21342+05
Rural	109	.92413+02	.12400+03	.15375+05

Standard Deviations in Analysis (Token)

Source	N	Mean	Standard Deviations	Variance
Grade 2	133	.13671+03	.12657+03	.16020+05
Grade 4	142	.28317+02	.10843+03	.11758+05
Grade 6	161	.37888+00	.81622+02	.66621+04
Male	240	.61375+02	.12594+03	.15860+05
Female	196	.45689+02	.11161+03	.12457+05
Low Reading	202	.86837+02	.12570+03	.15800+05
High Reading	234	.26256+02	.10710+03	.11470+05
Suburban	162	.34333+02	.11227+03	.12604+05
Urban	165	.75182+02	.13145+03	.17278+05
Rural	109	.52459+02	.10743+03	.11541+05

Even though the assumption was violated with the grade level variable, the F values were so highly significant that one can place reliance on the significant findings of this study. P less than .01 was the selected level of significance in both analyses (type and token). As can be seen from the following table, the levels for the significant Between cells main effects and interactions were much greater than .01.

F Values and P Levels for Significant Between Cells Main Effects
and Interactions on Analysis One (Type) and Analysis Two (Token)

Analysis One (Type)

Source of Variance	F	P less than
Grade Level	93.2776	.0001
Reading Level	41.7527	.0001
Community Type	6.4804	.0017
G X CT	3.6480	.0063

Analysis Two (Type)

Grade Level	72.439	.0001
Reading Level	38.439	.0001
Community Type	7.847	.0005
G X CT	3.434	.0090

B I B L I O G R A P H Y

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